

UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE

A PROGRESS REPORT ON  
THE TREATMENT OF BLISTER RUST TRUNK CANKERS  
ON WESTERN WHITE PINE WITH ACTI-DIONE  
ON A PROJECT BASIS  
KANIKSU NATIONAL FOREST  
1957



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INTRODUCTION

In July of 1953 the first white pine trunk cankers were treated on an experimental basis in the Coeur d'Alene National Forest with the anti-biotic "Acti-dione"; and through the 1956 season the treating of trunk cankers was continued experimentally and proved to be 100 percent effective if properly applied (1).

On the basis of the results obtained, the Kaniksu National Forest blister rust control project established work plans for the inspection and treatment of 20,000 trees on a project basis during the 1957 field season.

METHODS AND MATERIALS

Areas Selected

Four plantations and one natural stand were selected for work areas. These areas are as follows:

1. Pelke, a natural stand of western white pine in the 1921-40 year age class. Trees vary in diameter and height. It is on level ground with moderate amounts of brush composed of mixed species. Cankers are old and medium to large in size.
2. Kalispell Creek plantation is a pure stand of western white pine, 1921-40 year age class, free of brush, fully stocked, and on level ground. The cankers are medium in size, near ground line, and required little cleaning.
3. The Nuisance Creek plantation is a 1921-40 year age class of western white pine and poorly stocked due to loss from blister rust infection. Topography is level with Ceanothus present. The cankers were large, requiring cleaning, with much soft rot and beetles present.
4. The Reynolds Creek plantation is a 1921-40 year age class, on a moderate slope, and relatively free from brush. Full stocking occurred throughout the area. Cankers were low on the trunk and small, but some cleaning was required.
5. Camp 15 plantation is on level ground, planted in pure white pine and free from brush. Cankers treated were small, low on the trunk, and little cleaning was necessary. The area is made up of two age classes, 1951-60 and 1941-50. The majority of time was spent in treating the older age class trees.

## Tree Inspection

Men selected for the work were high caliber workers or, if available, forestry students. The program was set up on a single tree inspection system. The dragline method as used in ribes eradication work and the standard grid system of lots and lanes was used. Where practical, areas were chosen in camp areas doing ribes eradication work so that maximum use could be made of string lines and the lot and lane system.

Two draglines were used alternately by the crewman to mark the area as he worked back and forth across the lane. The mechanical procedure of working the area was as follows:

1. Lay out draglines across the lane with a distance of one-half to one and one-half chains between lines depending upon number, spacing, and size of trees and amount of brush.
2. Spray can is set on one side of lane under string between draglines.
3. With hand ax and pruning saw, work from opposite direction between draglines inspecting and pruning trees with trunk cankers. Cards consecutively numbered were hung on the trees to be treated. Also, a count of all white pine inspected is made during this procedure.
4. After all trees have been examined in the drag, the number of trees inspected are recorded.
5. Pick up spray can and leave pruning saw at lane boundary. Go back through drag and find trees that were pruned and are to be treated, collecting cards to see that none have been omitted. Spray cankers to be treated to determine area of discoloration. Cut or excise canker with hand ax as described under "Canker Treatment". Spray canker generously with Acti-dione in oil to wet the cut surface of wounds to complete the treatment.
6. At completion of treatment of damaged trees at the end of the drag, record number of trees treated. Set spray can under string line.
7. Pull dragline through for next strip which brings man to pruning saw at the opposite end from spray can. Pick up saw and proceed towards spray can on next drag.

## Canker Treatment

All trees with trunk cankers which are crop trees or trees to be harvested in an intermediate cutting were treated. Trees were treated if they contained good bark on one-third or more of the trunk circumference and needles were not chlorotic or dwarfed. Limbs on the treated trees were pruned to a sufficient height to insure safe working conditions when treating trunk cankers.

At the beginning of the project, all dead bark was removed from a canker. Later, after inspecting some of last year's experimental treatments, this type of practice was limited only to cankers that contained wood rot or beetle infestations. Wood rot usually was associated with dead bark that was moist and spongy around branch stubs and cankers at ground line. This type of bark was removed to facilitate Acti-dione penetration.

A light film of the Acti-dione stove oil mixture was applied to the infected portion of the tree trunk to outline the margin of discoloration distinctly. With hatchet the moist, spongy, dead bark was excised from the canker to expose wood-rotting fungi and destroy bark beetle infestations. Slits the length of a hatchet blade were then spaced about three inches apart and centered on the margin that outlines the discoloration. Single slits should occur at the upper and outer edges of a canker. The Acti-dione stove oil mixture at a concentration of 150 ppm was generously applied to the cut surfaces.

The solution is translocated in the tree with greater penetration in a downward and lateral direction. Stove oil in the solution was successful in killing bark beetles when present.

Cankered limbs on all inspected trees were pruned. If limb cankers were within six inches of the trunk, a longitudinal slit was made on the trunk where limb had been pruned and treated with Acti-dione stove oil mixture. Stewart (2) studying methods to eliminate cankers from young eastern white pine, *Pinus strobus* L., found that he could save 100 percent of the trees by pruning diseased branches where the proximal margin of the branch canker was greater than six inches from the trunk.

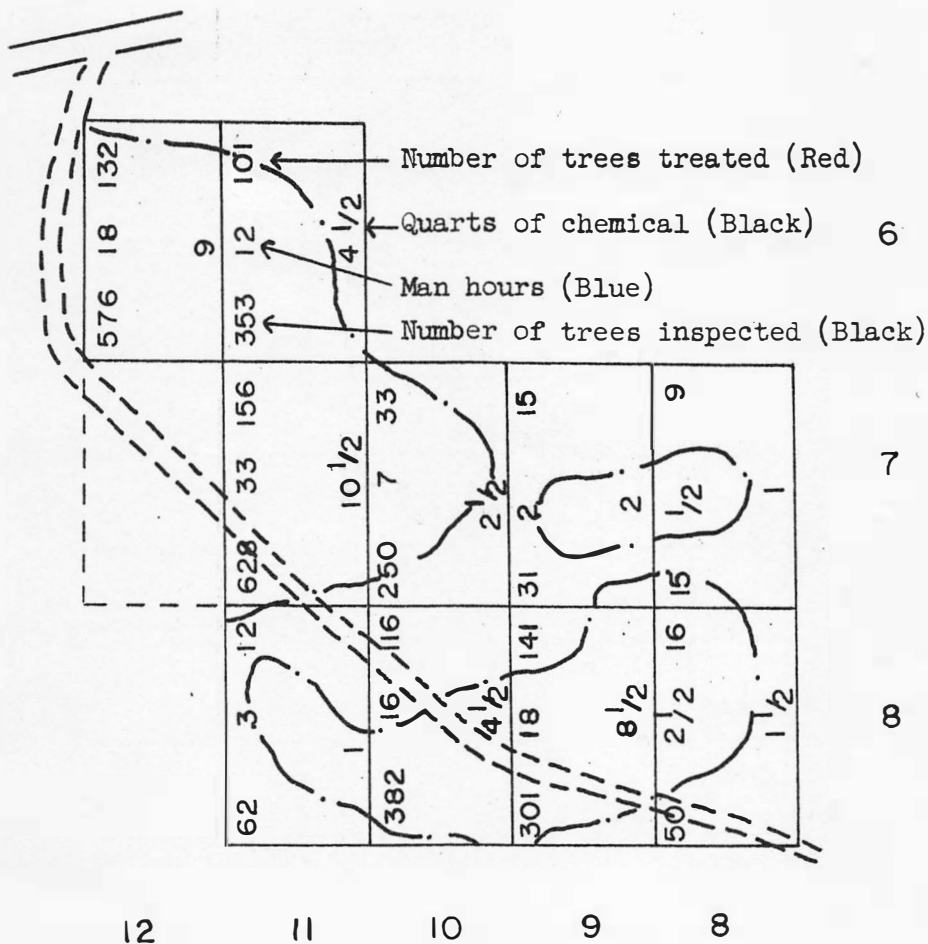
## Records

The lot report used in ribes eradication work was adapted for use in record keeping. Total trees inspected and trees treated were kept by drags. At the end of each day, hours worked, total trees treated, total trees inspected and quarts of chemical were entered. When a lot was completed, the information was entered on a lot map.

Figure 1. Sample of a lot report.

LOT REPORT						
Crewman <u>Wiley</u> Lane <u>12</u> Lot <u>6</u>						
ERADICATION					Str.	Ribes Location
Date	Hrs.	Trees Inspect.	Trees Treated	Work.		
					9 40	Trees treated Trees inspected
8/4	8	280	50		6 32	
8/5	8	232	66		2 50	
8/6	2	64	16		12 45	
					13 40	
					8 35	
Total	18	576	132		7 39	
					5 40	
					9 45	
					12 43	
					6 37	
					10 50	
					11 30	
					14 35	
Quarts Chemical <u>9</u>					8 15	

Figure 2. Sample of Lot Map.



LEGEND

- . — . — Type line
- ==== Main road
- ===== Secondary road

KALISPELL CREEK

S23 T36N R45E

1921-40 Age Class





Figure 3. Western white pine blister rust canker excised and treated by Acti-dione. This shows method of cleaning dark, soft rot from canker, which is common around branch stubs and when canker is at ground line.



Figure 4. Horizontal cut made above original discoloration and sprayed. Picture illustrates the upward extent of mycelium not noticeable when canker was originally treated.



Figure 5. This picture illustrates a canker in the pycniospore stage. Little broken or dead bark present. Canker was treated by cutting edge of original discoloration with ax and spraying with Acti-dione.



Figure 6. A western white pine blister rust canker in the juvenile stage. Canker was slit with blade of clipper through center of discoloration and treated.



## RESULTS AND DISCUSSION

First preference in treatment of stands with Acti-dione should be given to young pole stands in blister rust control units where blister rust damage will reduce stocking to a point below that which is considered for good management. In these stands interplanting is generally out of the question.

In most cases reproduction can be deferred unless damage is exceedingly high as rust damage acts as a thinning process in these stands. If a question exists as to the amount of damage, a damage and stocking survey can be made prior to actual treatment.

Cost of treatment was lowest in the 1951-60 year age class Camp 15 stand as shown in Table 1. Pruning of trees was done only to eliminate branch cankers. The chemical can was carried on a pack board by the laborer as he worked the area. Branches were small enough so that hand clipper was the only tool needed. When inspecting the tree and a trunk canker was found, the worker slit the canker with the blade of the pruner and sprayed on solution in one operation. Even though more trees per acre were inspected, the worker was able to progress faster through the area by this method.

In Table 1, percent of damage shown is not comparable with damage as determined in blister rust disease stocking survey methods (3). Limbs were pruned when cankers were found. No determination was made as to whether the limb canker was a killing canker. Trees counted as treated were those that were incised on the trunk and sprayed with solution. Thus, only limb cankers within six inches of the trunk were counted as treated.

In one natural, uneven-age stand, the worker had some trouble in determining dominant, codominant, intermediate, and suppressed trees. Some trouble in this respect was noticeable in other areas. This requires close supervision of the men when starting work in new areas. Some trouble was also experienced by the worker cutting more than was necessary around the canker.

Production could be increased and cost of treatment in young pole stands reduced if a trouble-free spray can of about one gallon capacity with a built-in pump could be developed. It should be of such size that it could be easily carried on the back. Also a single tool is needed to cut limbs and incise cankers. A suggested tool to fit this need could be a pair of hand clippers with greater leverage but not too large to be cumbersome. Cheaper cost in treatment can also be obtained by treating trees before cankers are in the aeciospore stage. In this stage cankers contain a large amount of dead and dying bark and, in many cases, rot.

Table 1. Results of treatment of blister rust trunk cankers on western white pine on a project basis during the 1957 field season. Cost figures based on wage rate of \$13.20 per man day and 60 cents per gallon for chemical.

Location	No. of Trees Treated and Inspected	No. of Trees Treated	Percent of Damage	Trees Treated and Inspected Per Man Day	Trees Treated Per Man Day	Man Days	Acres	Man Days/Acre	Gallons of Chemical	Trees Treated/Gal. Solution	Cost Per Tree Treated	Cost Chemical Per Treated Tree	Total Cost Per Tree Treated
Nuisance Creek 1921-40 Age Class	1,086	503	46.4	87.6	40.6	12.4	9.9	1.3	6.8	73.9	.325	.008	.333
Reynolds Creek 1921-40 Age Class	3,978	462	11.6	397.8	46.2	10.0	10.0	1.0	11.5	40.8	.286	.015	.301
Kalispell Creek 1921-40 Age Class	2,648	731	27.7	189.1	52.2	14.0	8.5	1.6	11.2	65.3	.253	.009	.262
Pelke 1921-40 Age Class	1,563	257	16.4	150.3	24.7	10.4	4.7	2.2	9.2	27.9	.534	.021	.555
Camp 15 1951-60 Age Class	1,909	215	11.3	803.8	90.5	2.4	4.3	.6	2.6	82.1	.147	.007	.154
Camp 15 1941-50 Age Class	7,910	1,278	16.2	395.5	63.9	20.0	21.4	.9	16.0	79.9	.207	.007	.214
Totals & Averages	19,094	3,446	18.0	275.9	49.8	69.2	58.8	1.2	57.3	60.1	.265	.010	.275

## SUMMARY

An Acti-dione project to prevent damage and to preserve adequate stocking in western white pine stands infected by blister rust before ribes were destroyed was initiated on the Kaniksu National Forest. Accomplishment during the past field season was 20,000 trees inspected of which 3,500 trees were treated. Results obtained indicate that there is a place in our blister rust program to do Acti-dione work in our blister rust control units in conjunction with ribes eradication work.

Average cost per treated tree was 27.5 cents. Cost per treated tree was cheaper in reproduction than young pole stands. This was accounted for in that less pruning was required and a better method of inspection and treatment was adaptable to this age class. Indications are that greater production and lower cost can be obtained in young pole stands with adaptation of a better spray can and a combination cutting and pruning tool.

Good training of inexperienced workers is essential as they have difficulty in determining dominant, codominant, intermediate, and suppressed trees. Also, it is more difficult for the worker to determine crop trees in uneven-age stands than in even-age stands.

## LITERATURE CITED

- (1) Moss, Virgil D., 1957. Acti-dione Treatment of Blister Rust Trunk Cankers on Western White Pine. Plant Disease Reporter 41, pp. 709-714.
- (2) Stewart, D. M., 1952. Factors Affecting Local Control of White Pine Blister Rust (Abstr.), Phytopathology 42, pp. 475-476.
- (3) Bingham, R. T., 1949. Northwestern Region Stocking-Rust Damage Survey Manual. U.S.D.A. Bureau of Entomology and Plant Quarantine, 20 pp.